

WHAT IS CLAIMED IS:

1. An impact resistance composite comprised of two or more layers, at least one of said layers is a fibrous layer comprising a network of filaments in a rigid matrix which comprises one or more thermosetting resins and one or more thermoplastic resins and an effective amount of an initiating/compatibilization agent.

2. A composite according to claim 1 wherein said filaments have a tensile modulus of at least about 150g/denier, an energy-to-break of at least about 8j/g and a tenacity equal to or greater than about 7g/denier.

3. A composite as recited in claim 2 wherein the filaments have a tenacity equal to or greater than about 10 g/d, a tensile modulus equal to or greater than about 300 g/d and an energy-to-break equal to or greater than about 10 j/g.

4. A composite as recited in claim 3 wherein said tenacity is equal to or greater than about 20 g/d, said modulus is equal to or greater than about 500 g/d and said energy-to-break is equal to or greater than about 15 j/g.

5. A composite as recited in claim 4 wherein said tenacity is equal to or greater than about 25 g/d, said modulus is equal to or greater than about 1000 g/d, and said energy-to-break is equal to or greater than about 20 j/g.

6. A composite as recited in claim 5 wherein said tenacity is equal to or greater than about 30 g/d, said modulus equal to or greater than about 1300 g/d and the energy-to-break is equal to or greater than about 40 j/g.

7. A composite as recited in claim 1 wherein said filaments are polyethylene filaments having tenacity equal to or greater than about 20g/denier, a tensile modulus of at least about 800 g/denier and an energy-to-break of at least 35 j/g.

8. A composite as recited in claim 1 wherein said composite comprises more than one layer and wherein the peel strength between at least two adjacent layers is equal to or greater than about 1.5 lbs/in.

9. A composite as recited in claim 8 wherein said peel strength is equal to or greater than about 3 lbs/in.

10. A composite as recited in claim 9 wherein said peel strength is equal to or greater than about 6 lbs/in.

11. A composite as recited in claim 10 wherein said peel strength is equal to or greater than about 8 lbs/in.

12. A composite as recited in claim 1 wherein said network of filaments comprises a sheet-like filament array in which said filaments are arranged substantially parallel to one another along a common filament direction.

13. A composite as recited in claim 12 wherein said composite comprises more than one layer, with adjacent layers aligned 90° which respect to the longitudinal axis of the parallel filaments contained in said layers.

14. A composite as recited in claim 13 wherein the peel strength between at least two adjacent layers is equal to or greater than about 3 lbs/in.

15. A composite as recited in claim 1 wherein said network of filaments comprises a non-woven fabric.

16. A composite as recited in claim 1 wherein said network of filaments comprises a woven fabric.

17. A composite as recited in claim 1 wherein the volume fraction of said filaments is at least about 0.4.

18. A composite as recited in claim 1 wherein said matrix material comprises one or more thermosetting resins selected from the group consisting of vinyl esters, phenolic, epoxies, allylics, urethanes, unsaturated polyesters and alkyds, and one or more thermoplastic resins selected from the group consisting of polyamides, polystyrene-polyisoprene-polystyrene block copolymer, polyacrylics, polycarbonates, polyurethanes, polyarylene oxides, polyarylene sulfones, polyarylene sulfides, polyacetals, polyvinyl acetate, polyether ether ketones, polyaramids, polyesteramides, and polyimides.

19. A composite as recited in claim 18 wherein said thermosetting resins are selected from the group consisting of vinyl esters, phenolics and epoxies, and said thermoplastic resins are selected from the group consisting of polyurethanes and polyamides.

20. A composite as recited in claim 1 wherein said matrix comprises a thermoplastic polyurethane and a thermosetting vinyl ester.

21. A composite as recited in claim 1 wherein the matrix comprises a thermoplastic polystyrene-polyisoprene-polystyrene block copolymer and a thermoset vinyl ester.

22. A composite according to claim 1 wherein the modulus of said matrix material is equal to or greater than about 3,450 kPa.

23. A composite according to claim 1 which further comprises at least one layer of a hard rigid material.

24. A composite according to claim 23 wherein said rigid material is selected from the group consisting of metals, ceramics, and glass reinforced polymers.

25. A composite as recited in claim 1 wherein said effective amount is at least 1% by weight of the blend.

26. A composite as recited in claim 25
5 wherein said effective amount is from about 1% by weight to about 20% by weight.

27. A composite as recited in claim 26 wherein said effective amount is from about 1% by weight to about 10% by weight.

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